METHOD, APPARATUS AND SYSTEM

FIELD

[0001] The present application relates to a method, apparatus and system and in particular but not exclusively, co-primary spectrum sharing.

BACKGROUND

[0002] A communication system can be seen as a facility that enables communication sessions between two or more entities such as user terminals, base stations and/or other nodes by providing carriers between the various entities involved in the communications path. A communication system can be provided for example by means of a communication network and one or more compatible communication devices. The communications may comprise, for example, communication of data for carrying communications such as voice, electronic mail (email), text message, multimedia and/or content data and so on. Non-limiting examples of services provided include two-way or multi-way calls, data communication or multimedia services and access to a data network system, such as the Internet.

[0003] In a wireless communication system at least a part of communications between at least two stations occurs over a wireless link. Examples of wireless systems include public land mobile networks (PLMN), satellite based communication systems and different wireless local networks, for example wireless local area networks (WLAN). The wireless systems can typically be divided into cells, and are therefore often referred to as cellular systems.

[0004] A user can access the communication system by means of an appropriate communication device or terminal. A communication device of a user is often referred to as user equipment (UE). A communication device is provided with an appropriate signal receiving and transmitting apparatus for enabling communications, for example enabling access to a communication network or communications directly with other users. The communication device may access a carrier provided by a station, for example a base station of a cell, and transmit and/or receive communications on the carrier.

[0005] The communication system and associated devices typically operate in accordance with a given standard or specification which sets out what the various entities associated with the system are permitted to do and how that should be achieved. Communication protocols and/or parameters which shall be used for the connection are also typically defined. An example of attempts to solve the problems associated with the increased demands for capacity is an architecture that is known as the long-term evolution (LTE) of the Universal Mobile Telecommunications System (UMTS) radio-access technology. The LTE is being standardized by the 3rd Generation Partnership Project (3GPP). The various development stages of the 3GPP LTE specifications are referred to as releases. The aim of the standardization is to achieve a communication system with, inter alia, reduced latency, higher user data rates, improved system capacity and coverage, and reduced cost for the operator.

SUMMARY

[0006] In a first aspect there is provided a method comprising determining, for a first network, first activity information for shared usage of a first portion of a spectrum allocated to the first network with at least one second network and causing the activity information to be sent to at least one base station of said second network.

[0007] The first network may be operated by a first operator of a plurality of operators.

[0008] The at least one second network may be operated by a second operator of the plurality of operators

[0009] The first portion may be an inter-operator sharing portion.

[0010] The spectrum allocated to the first network may comprise a second portion.

[0011] The second portion is an intra-operator sharing portion.

[0012] The method may comprise causing shared usage of the intra-operator portion with the at least one second network in dependence of a request from the second network.

[0013] The allocated spectrum may be used for co-primary spectrum sharing.

[0014] Determining activity information may comprise selecting an activity indicator from a set of activity indicators.

[0015] The method may comprise determining activity information in dependence of cell density.

[0016] The method may comprise determining activity information in dependence of at least one of relative traffic volumes of a cell and interference levels of a cell.

[0017] The activity information may be static.

[0018] The method may be carried out at a spectrum controller.

[0019] The activity information may be dynamic

[0020] The method may be carried out at a base station.

[0021] The spectrum allocated to the first network may comprise a third portion.

[0022] The third portion may lie between the first and second portion.

[0023] In a second aspect there is provided a method comprising receiving first activity information associated with a first network and determining, for a first portion of a spectrum shared between said first network and at least one second network, if said second network is to change said share of said spectrum in dependence of said activity information.

[0024] The method may comprise receiving second activity information associated with the first network comparing the second activity information with the first activity information and determining, for a first portion of a spectrum shared between said first network and at least one second network, if said second network is to change said share of said spectrum in dependence of said comparison.

[0025] The method may comprise causing a request to be sent to the first network for a change in said share of said spectrum

[0026] The first portion of the spectrum may be at least a portion of an inter-operator sharing portion.

[0027] The first portion of the spectrum may be at least a portion of an intra-operator sharing portion.

[0028] The method may comprise receiving activity information from a spectrum controller, or a base station of the first network.

[0029] The activity information may be static or dynamic.